

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	"10744444"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:16
L2	2	("6959390").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:22
L3	1070	(identical\$2 with (structur\$3 or tree or hierarch\$3) with storage\$1)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:42
L4	64	((creat\$3 or generat\$3) with identical\$2 with (structur\$3 or tree or hierarch\$3) with storage\$1)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:24
L5	8774	((root or tree or hierarch\$3) with key)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:43
L6	3	4 and 5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:25
L7	17	3 and 5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:25
L8	6	7 and @ad<"20001115"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:44

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L9	61	(dual with key with (tree or hierarch\$3 or structur\$3)) and @ad<"20001115"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:29
L10	0	9 and 3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:30
L11	7	9 and 5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:30
L12	17549	(public with key) and (private with key)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 13:52
L13	1480	12 and 5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:43
L14	180763	((structur\$3 or tree or hierarch\$3) with storage\$1)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:44
L15	335	13 and 14	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:44
L16	73	15 and @ad<"20001115"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:48

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L17	123703	((structur\$3 or tree or hierarch\$3) with identical\$2)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:45
L18	5	16 and 17	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:45
L19	1743	((structur\$3 or tree or hierarch\$3 or root) with storage\$1 with key)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:47
L20	35	19 and 3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:47
L21	15	20 and @ad<"20001115"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 13:51
L22	66	19 and 12 and @ad<"20001115"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 12:52
L23	12	22 and (usage with key)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 13:53
L24	44	((migrat\$5 or transfer\$3) with storage with (tree or root or hierarch\$3 or structur\$3)) and (usage with key)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:28

EAST Search History

L25	81	((migrat\$5 or transfer\$3) with storage with (tree or root or hierarch\$3 or structur\$3)) and 3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 14:49
L26	212214	"225" and @ad<"20001115"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 13:52
L27	45	25 and @ad<"20001115"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 14:51
L28	0	27 and 12	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 13:52
L29	0	27 and (usage with key)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 13:53
L30	2	27 and (key with load\$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 13:54
L31	0	27 and (key with (tree or hierarch\$3 or root))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 14:51
L32	0	27 and 707/100.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 14:47

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L33	1	("7242768").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 14:49
L34	1	"6212635".PN.	USPAT; USOCR	OR	OFF	2007/07/15 14:48
L35	1	25 and (securit\$3 with key)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:29
L36	103	((migrat\$5 or transfer\$3) with storage with (tree or root or hierarch\$3 or structur\$3)) and (securit\$3 with key)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 14:49
L37	22	36 and (key with (tree or hiearch\$3 or root))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 14:51
L38	1	37 and @ad<"20001115"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 14:51
L39	30	36 and @ad<"20001115"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:42
L40	2	"016900".apn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 14:53
L41	2	"016700".apn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 14:53

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L42	3656	((migrat\$5 or transfer\$3) with (sign\$3 or signature) with key)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:29
L43	632	42 and (securit\$3 with key)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:29
L44	1	43 and 3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:30
L45	184	43 and 5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:30
L46	7	45 and (380/277).ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:30
L47	41	((structur\$3 or tree or hierarch\$3) with storage\$1 with key) and 43	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:42
L48	10	47 and @ad<"20001115"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/07/15 15:42

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1 Physical storage structures: The K-D-B-tree: a search structure for large multidimensional dynamic indexes

 John T. Robinson

April 1981 **Proceedings of the 1981 ACM SIGMOD international conference on Management of data SIGMOD '81**

Publisher: ACM Press

Full text available:  [pdf\(723.91 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

The problem of retrieving multikey records via range queries from a large, dynamic index is considered. By *large* it is meant that most of the index must be stored on secondary memory. By *dynamic* it is meant that insertions and deletions are intermixed with queries, so that the index cannot be built beforehand. A new data structure, the *K-D-B-tree*, is presented as a solution to this problem. K-D-B-trees combine properties of K-D-trees and B-trees. It is expected that the mult ...

2 Physical storage structures: B+ trees and indexed sequential files: a performance comparison

 D. S. Batory

April 1981 **Proceedings of the 1981 ACM SIGMOD international conference on Management of data SIGMOD '81**

Publisher: ACM Press

Full text available:  [pdf\(858.82 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

An analytic method for comparing the performance of B+ trees and indexed sequential files is proposed. Preliminary results indicate that indexed sequential files may be more efficient than B+ trees in certain applications.

3 Decision Trees and Diagrams

 Bernard M. E. Moret

December 1982 **ACM Computing Surveys (CSUR)**, Volume 14 Issue 4

Publisher: ACM Press

Full text available:  [pdf\(2.68 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

4 Sensor networks: Data storage placement in sensor networks

Bo Sheng, Qun Li, Weizhen Mao

May 2006 **Proceedings of the seventh ACM international symposium on Mobile ad**

hoc networking and computing MobiHoc '06

 Publisher: ACM Press

Full text available:  pdf(311.81 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Data storage has become a important issue in sensor networks as a large amount of collected data need to be archived for future information retrieval. This paper introduces storage nodes to store the data collected from the sensors in their proximities. The storage nodes alleviate the heavy load of transmitting all the data to a central place for archiving and reduce the communicatio cost induced by the network query. This paper considers the storage node placement problem aiming to minimize the ...

Keywords: data query, data storage, wireless sensor networks

5 Self-assessment procedure XIII: a self-assessment procedure dealing with binary

 search trees and B-trees

Gopal K. Gupta

May 1984 **Communications of the ACM**, Volume 27 Issue 5

Publisher: ACM Press

Full text available:  pdf(594.09 KB) Additional Information: [full citation](#), [references](#), [index terms](#)

6 Region proximity in metric spaces and its use for approximate similarity search

 Giuseppe Amato, Fausto Rabitti, Pasquale Savino, Pavel Zezula

April 2003 **ACM Transactions on Information Systems (TOIS)**, Volume 21 Issue 2

Publisher: ACM Press

Full text available:  pdf(1.01 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Similarity search structures for metric data typically bound object partitions by ball regions. Since regions can overlap, a relevant issue is to estimate the proximity of regions in order to predict the number of objects in the regions' intersection. This paper analyzes the problem using a probabilistic approach and provides a solution that effectively computes the proximity through realistic heuristics that only require small amounts of auxiliary data. An extensive simulation to validate the t ...

Keywords: Approximation algorithms, approximate similarity search, metric data, metric trees, performance evaluation

7 Height-balanced trees of order (β, γ, δ)

 Shou-Hsuan S. Huang

June 1985 **ACM Transactions on Database Systems (TODS)**, Volume 10 Issue 2

Publisher: ACM Press

Full text available:  pdf(1.71 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

We study restricted classes of B-trees, called $H(\beta, \gamma, \delta)$ trees. A class is defined by three parameters: β , the size of a node; γ , the minimal number of grandsons a node must have; and δ , the minimal number of leaves bottom nodes must have. This generalizes the brother condition of 2-3 brother trees in a uniform way to B-trees of higher order. The class of B-trees of order m is obtained by choosing $\beta = m$, $\gamma = (m/2)^2$ and $\delta = m/2$. An al ...

8 Implanting FFP trees in binary trees: An architectural proposal

Donald MacDavid Tolle

October 1981 **Proceedings of the 1981 conference on Functional programming languages and computer architecture FPCA '81**

Publisher: ACM Press

Full text available: [pdf\(611.57 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The computer architecture described here was inspired by Magó's recently proposed cellular computer [1979] based on the Formal Functional Programming (FFP) languages introduced by Backus [1978]. Magó's machine is a binary tree of many simple processor/memory units, called cells. FFP programs are stored, one symbol per cell, in the leaf cells ("L" cells) of the machine. The machine fully exploits all the parallelism expressed in an FFP program, storage space permitt ...

9 **Power proximity based key management for secure multicast in ad hoc networks**

Loukas Lazos, Radha Poovendran

January 2007 **Wireless Networks**, Volume 13 Issue 1

Publisher: Kluwer Academic Publishers

Full text available: [pdf\(875.28 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

As group-oriented services become the focal point of ad hoc network applications, securing the group communications becomes a default requirement. In this paper, we address the problem of group access in secure multicast communications for wireless ad hoc networks. We argue that energy expenditure is a scarce resource for the energy-limited ad hoc network devices and introduce a cross-layer approach for designing energy-efficient, balanced key distribution trees to perform key management. To con ...

Keywords: ad hoc networks, energy efficiency, key management, multicast, security

10 **Improving duplicate elimination in storage systems**

Deepak R. Bobbarjung, Suresh Jagannathan, Cezary Dubnicki

November 2006 **ACM Transactions on Storage (TOS)**, Volume 2 Issue 4

Publisher: ACM Press

Full text available: [pdf\(481.90 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Minimizing the amount of data that must be stored and managed is a key goal for any storage architecture that purports to be scalable. One way to achieve this goal is to avoid maintaining duplicate copies of the same data. Eliminating redundant data at the source by not writing data which has already been stored not only reduces storage overheads, but can also improve bandwidth utilization. For these reasons, in the face of today's exponentially growing data volumes, redundant data elimination t ...

Keywords: Rabin's fingerprints, Storage management, content-based addressing, duplicate elimination

11 **Overlapping linear quadtrees: a spatio-temporal access method**

Theodoros Tzouramanis, Michael Vassilakopoulos, Yannis Manolopoulos

November 1998 **Proceedings of the 6th ACM international symposium on Advances in geographic information systems GIS '98**

Publisher: ACM Press

Full text available: [pdf\(837.72 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: B+ trees, quadtrees, access methods, indexing, linear quadtrees, overlapping, spatio-temporal databases, time/space performance, transaction time

12 Research sessions: compression: Dwarf: shrinking the PetaCube

 Yannis Sismanis, Antonios Deligiannakis, Nick Roussopoulos, Yannis Kotidis
June 2002 **Proceedings of the 2002 ACM SIGMOD international conference on Management of data SIGMOD '02**

Publisher: ACM Press

Full text available:  pdf(1.38 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Dwarf is a highly compressed structure for computing, storing, and querying data cubes. Dwarf identifies prefix and suffix structural redundancies and factors them out by coalescing their store. Prefix redundancy is high on dense areas of cubes but suffix redundancy is significantly higher for sparse areas. Putting the two together fuses the exponential sizes of high dimensional full cubes into a dramatically condensed data structure. The elimination of suffix redundancy has an equally dramatic ...

13 New methods for dynamic storage allocation (Fast Fits)

 C. J. Stephenson
October 1983 **ACM SIGOPS Operating Systems Review , Proceedings of the ninth ACM symposium on Operating systems principles SOSP '83**, Volume 17 Issue 5

Publisher: ACM Press

Full text available:  pdf(192.01 KB)

Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

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14 Parallel implementation of an extended functional programming language on cellular tree and data flow architectures

 Reza Sanati-Mehrizi, Krishna K. Agarwal, Afsaneh Minaie
March 1992 **Proceedings of the 1992 ACM/SIGAPP symposium on Applied computing: technological challenges of the 1990's SAC '92**

Publisher: ACM Press

Full text available:  pdf(728.82 KB)

Additional Information: [full citation](#), [references](#), [index terms](#)

15 Distributed transactions for reliable systems

 Alfred Z. Spector, Dean Daniels, Daniel Duchamp, Jeffrey L. Eppinger, Randy Pausch
December 1985 **ACM SIGOPS Operating Systems Review , Proceedings of the tenth ACM symposium on Operating systems principles SOSP '85**, Volume 19 Issue 5

Publisher: ACM Press

Full text available:  pdf(1.44 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

16 Table compression for tree automata

 Jürgen Börstler, Ulrich Möncke, Reinhard Wilhelm
July 1991 **ACM Transactions on Programming Languages and Systems (TOPLAS)**, Volume 13 Issue 3

Publisher: ACM Press

Full text available:  pdf(1.15 MB)

Additional Information: [full citation](#), [references](#), [index terms](#), [review](#)

Keywords: sparse tables, table compression, tree automata

17 Key addressable data storage

 Roger Eggen

April 1998 **Proceedings of the 36th annual Southeast regional conference ACM-SE 36**

Publisher: ACM Press

Full text available:  pdf(423.23 KB) Additional Information: [full citation](#), [references](#), [index terms](#)



18 Packet classification on multiple fields

 Pankaj Gupta, Nick McKeown

August 1999 **ACM SIGCOMM Computer Communication Review , Proceedings of the conference on Applications, technologies, architectures, and protocols for computer communication SIGCOMM '99**, Volume 29 Issue 4

Publisher: ACM Press

Full text available:  pdf(1.46 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)



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19 Industrial sessions: database internals - I: Query processing for SQL updates

 César A. Galindo-Legaria, Stefano Stefani, Florian Waas

June 2004 **Proceedings of the 2004 ACM SIGMOD international conference on Management of data SIGMOD '04**

Publisher: ACM Press

Full text available:  pdf(73.48 KB) Additional Information: [full citation](#), [abstract](#), [references](#)



A rich set of concepts and techniques has been developed in the context of query processing for the efficient and robust execution of queries. So far, this work has mostly focused on issues related to data-retrieval queries, with a strong backing on relational algebra. However, update operations can also exhibit a number of query processing issues, depending on the complexity of the operations and the volume of data to process. Such issues include lookup and matching of values, navigational vs. ...

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 L. E. Stanfel

July 1972 **Journal of the ACM (JACM)**, Volume 19 Issue 3

Publisher: ACM Press

Full text available:  pdf(614.61 KB) Additional Information: [full citation](#), [references](#), [index terms](#)



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 1 [Physical storage structures: The K-D-B-tree: a search structure for large multidimensional dynamic indexes](#)

John T. Robinson

April 1981 **Proceedings of the 1981 ACM SIGMOD international conference on Management of data SIGMOD '81**

Publisher: ACM Press

Full text available:  pdf(723.91 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

The problem of retrieving multikey records via range queries from a large, dynamic index is considered. By *large* it is meant that most of the index must be stored on secondary memory. By *dynamic* it is meant that insertions and deletions are intermixed with queries, so that the index cannot be built beforehand. A new data structure, the *K-D-B-tree*, is presented as a solution to this problem. K-D-B-trees combine properties of K-D-trees and B-trees. It is expected that the mult ...

 2 [Physical storage structures: B+ trees and indexed sequential files: a performance comparison](#)

D. S. Batory

April 1981 **Proceedings of the 1981 ACM SIGMOD international conference on Management of data SIGMOD '81**

Publisher: ACM Press

Full text available:  pdf(858.82 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

An analytic method for comparing the performance of B+ trees and indexed sequential files is proposed. Preliminary results indicate that indexed sequential files may be more efficient than B+ trees in certain applications.

 3 [Decision Trees and Diagrams](#)

Bernard M. E. Moret

December 1982 **ACM Computing Surveys (CSUR)**, Volume 14 Issue 4

Publisher: ACM Press

Full text available:  pdf(2.68 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

 4 [Sensor networks: Data storage placement in sensor networks](#)

Bo Sheng, Qun Li, Weizhen Mao

May 2006 **Proceedings of the seventh ACM international symposium on Mobile ad**

hoc networking and computing MobiHoc '06

 Publisher: ACM Press

Full text available:  pdf(311.81 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Data storage has become an important issue in sensor networks as a large amount of collected data need to be archived for future information retrieval. This paper introduces storage nodes to store the data collected from the sensors in their proximities. The storage nodes alleviate the heavy load of transmitting all the data to a central place for archiving and reduce the communication cost induced by the network query. This paper considers the storage node placement problem aiming to minimize the ...

Keywords: data query, data storage, wireless sensor networks

5 Self-assessment procedure XIII: a self-assessment procedure dealing with binary

 search trees and B-trees

Gopal K. Gupta

May 1984 **Communications of the ACM**, Volume 27 Issue 5

Publisher: ACM Press

Full text available:  pdf(594.09 KB) Additional Information: [full citation](#), [references](#), [index terms](#)

6 Region proximity in metric spaces and its use for approximate similarity search

 Giuseppe Amato, Fausto Rabitti, Pasquale Savino, Pavel Zezula

April 2003 **ACM Transactions on Information Systems (TOIS)**, Volume 21 Issue 2

Publisher: ACM Press

Full text available:  pdf(1.01 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Similarity search structures for metric data typically bound object partitions by ball regions. Since regions can overlap, a relevant issue is to estimate the proximity of regions in order to predict the number of objects in the regions' intersection. This paper analyzes the problem using a probabilistic approach and provides a solution that effectively computes the proximity through realistic heuristics that only require small amounts of auxiliary data. An extensive simulation to validate the t ...

Keywords: Approximation algorithms, approximate similarity search, metric data, metric trees, performance evaluation

7 Height-balanced trees of order (β, γ, δ)

 Shou-Hsuan S. Huang

June 1985 **ACM Transactions on Database Systems (TODS)**, Volume 10 Issue 2

Publisher: ACM Press

Full text available:  pdf(1.71 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

We study restricted classes of B-trees, called $H(\beta, \gamma, \delta)$ trees. A class is defined by three parameters: β , the size of a node; γ , the minimal number of grandsons a node must have; and δ , the minimal number of leaves bottom nodes must have. This generalizes the brother condition of 2-3 brother trees in a uniform way to B-trees of higher order. The class of B-trees of order m is obtained by choosing $\beta = m$, $\gamma = (m/2)2$ and $\delta = m/2$. An al ...

8 Implanting FFP trees in binary trees: An architectural proposal

Donald MacDavid Tolle

October 1981 **Proceedings of the 1981 conference on Functional programming languages and computer architecture FPCA '81**

Publisher: ACM Press

Full text available:  [pdf\(611.57 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The computer architecture described here was inspired by Magó's recently proposed cellular computer [1979] based on the Formal Functional Programming (FFP) languages introduced by Backus [1978]. Magó's machine is a binary tree of many simple processor/memory units, called cells. FFP programs are stored, one symbol per cell, in the leaf cells ("L" cells) of the machine. The machine fully exploits all the parallelism expressed in an FFP program, storage space permitt ...

9 Power proximity based key management for secure multicast in ad hoc networks 

Loukas Lazos, Radha Poovendran

January 2007 **Wireless Networks**, Volume 13 Issue 1

Publisher: Kluwer Academic Publishers

Full text available:  [pdf\(875.28 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

As group-oriented services become the focal point of ad hoc network applications, securing the group communications becomes a default requirement. In this paper, we address the problem of group access in secure multicast communications for wireless ad hoc networks. We argue that energy expenditure is a scarce resource for the energy-limited ad hoc network devices and introduce a cross-layer approach for designing energy-efficient, balanced key distribution trees to perform key management. To con ...

Keywords: ad hoc networks, energy efficiency, key management, multicast, security

10 Improving duplicate elimination in storage systems 

Deepak R. Bobbarjung, Suresh Jagannathan, Cezary Dubnicki

November 2006 **ACM Transactions on Storage (TOS)**, Volume 2 Issue 4

Publisher: ACM Press

Full text available:  [pdf\(481.90 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Minimizing the amount of data that must be stored and managed is a key goal for any storage architecture that purports to be scalable. One way to achieve this goal is to avoid maintaining duplicate copies of the same data. Eliminating redundant data at the source by not writing data which has already been stored not only reduces storage overheads, but can also improve bandwidth utilization. For these reasons, in the face of today's exponentially growing data volumes, redundant data elimination t ...

Keywords: Rabin's fingerprints, Storage management, content-based addressing, duplicate elimination

11 Overlapping linear quadtrees: a spatio-temporal access method 

Theodoros Tzouramanis, Michael Vassilakopoulos, Yannis Manolopoulos

November 1998 **Proceedings of the 6th ACM international symposium on Advances in geographic information systems GIS '98**

Publisher: ACM Press

Full text available:  [pdf\(837.72 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: B+ trees, quadtrees, access methods, indexing, linear quadtrees, overlapping, spatio-temporal databases, time/space performance, transaction time

12 Research sessions: compression: Dwarf: shrinking the PetaCube

 Yannis Sismanis, Antonios Deligiannakis, Nick Roussopoulos, Yannis Kotidis
June 2002 **Proceedings of the 2002 ACM SIGMOD international conference on Management of data SIGMOD '02**

Publisher: ACM Press

Full text available:  pdf(1.38 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Dwarf is a highly compressed structure for computing, storing, and querying data cubes. Dwarf identifies prefix and suffix structural redundancies and factors them out by coalescing their store. Prefix redundancy is high on dense areas of cubes but suffix redundancy is significantly higher for sparse areas. Putting the two together fuses the exponential sizes of high dimensional full cubes into a dramatically condensed data structure. The elimination of suffix redundancy has an equally dramatic ...

13 New methods for dynamic storage allocation (Fast Fits)

 C. J. Stephenson
October 1983 **ACM SIGOPS Operating Systems Review , Proceedings of the ninth ACM symposium on Operating systems principles SOSP '83**, Volume 17 Issue 5

Publisher: ACM Press

Full text available:  pdf(192.01 KB) Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

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Publisher: ACM Press

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 Pankaj Gupta, Nick McKeown

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Full text available:  pdf(73.48 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

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20 Practical Aspects of Doubly Chained Trees for Retrieval

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July 1972 **Journal of the ACM (JACM)**, Volume 19 Issue 3

Publisher: ACM Press

Full text available:  pdf(614.61 KB) Additional Information: [full citation](#), [references](#), [index terms](#)

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1 Applications and compliance: Virtual monotonic counters and count-limited objects using a TPM without a trusted OS

 Luis F. G. Sarmenta, Marten van Dijk, Charles W. O'Donnell, Jonathan Rhodes, Srinivas Devadas

November 2006 **Proceedings of the first ACM workshop on Scalable trusted computing STC '06**

Publisher: ACM Press

Full text available:  [pdf\(447.59 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A trusted monotonic counter is a valuable primitive that enables a wide variety of highly scalable offline and decentralized applications that would otherwise be prone to replay attacks, including offline payment, e-wallets, virtual trusted storage, and digital rights management (DRM). In this paper, we show how one can implement a very large number of *virtual* monotonic counters on an untrusted machine with a Trusted Platform Module (TPM) or similar device, without relying on a trusted OS ...

Keywords: certified execution, e-wallet memory integrity checking, key delegation, stored-value, trusted storage

2 Computer forensics (CF): The advent of trusted computing: implications for digital forensics

 Mike Burmester, Judie Mulholland

April 2006 **Proceedings of the 2006 ACM symposium on Applied computing SAC '06**

Publisher: ACM Press

Full text available:  [pdf\(137.02 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The release of computer hardware devices based on "trusted computing" technologies is heralding a paradigm shift that will have profound implications for digital forensics. In this paper, we map out the contours of a trusted environment in order to establish the context for the paper. This is followed by the main components of the TC architecture with an emphasis on the Trusted Platform and the Trusted Platform Module (TPM). The next section presents a synopsis based on three threat models, v ...

Keywords: cybercrime, data recovery, encryption, file systems, forensics, specifications, trusted computing

3 Access management for distributed systems: Peer-to-peer access control architecture using trusted computing technology

Ravi Sandhu, Xinwen Zhang

June 2005 **Proceedings of the tenth ACM symposium on Access control models and technologies SACMAT '05**

Publisher: ACM Press

Full text available: [pdf\(215.48 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

It has been recognized for some time that software alone does not provide an adequate foundation for building a high-assurance trusted platform. The emergence of industry-standard trusted computing technologies promises a revolution in this respect by providing roots of trust upon which secure applications can be developed. These technologies offer a particularly attractive platform for security in peer-to-peer environments. In this paper we propose a trusted computing architecture to enforce ac ...

Keywords: access control, policy enforcement, security architecture, trusted computing

4 Secure systems: Energy and execution time analysis of a software-based trusted platform module

Najwa Aaraj, Anand Raghunathan, Srivaths Ravi, Niraj K. Jha

April 2007 **Proceedings of the conference on Design, automation and test in Europe DATE '07**

Publisher: ACM Press

Full text available: [pdf\(838.82 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

Trusted platforms have been proposed as a promising approach to enhance the security of general-purpose computing systems. However, for many resource-constrained embedded systems, the size and cost overheads of a separate Trusted Platform Module (TPM) chip are not acceptable. One alternative is to use a software-based TPM (SW-TPM), which implements TPM functions using software that executes in a protected execution domain on the embedded processor itself. However, since many embedded systems ...

5 Architecture: Towards an open, trusted digital rights management platform

Andrew Cooper, Andrew Martin

October 2006 **Proceedings of the ACM workshop on Digital rights management DRM '06**

Publisher: ACM Press

Full text available: [pdf\(417.51 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Trusted computing has received criticism from those who fear it will be used by influential market forces to exert power over the software used on consumer platforms. This paper describes an open architecture for digital rights management (DRM) enforcement on trusted computing platforms that empowers the consumer to select their operating-system and applications, including open-source options, without weakening the strength of the security functions. A key component in the architecture is a secu ...

Keywords: DRM, digital rights management, mandatory access controls, trusted computing, virtual machines

6 Applications and compliance: TCG inside?: a note on TPM specification compliance

Ahmad-Reza Sadeghi, Marcel Selhorst, Christian Stüble, Christian Wachsmann, Marcel Winandy, Horst Götz

November 2006 **Proceedings of the first ACM workshop on Scalable trusted computing**

STC '06**Publisher:** ACM PressFull text available:  [pdf\(587.22 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The Trusted Computing Group (TCG) has addressed a new generation of computing platforms employing both supplemental hardware and software with the primary goal to improve the security and the trustworthiness of future IT systems. The core component of the TCG proposal is the Trusted Platform Module (TPM) providing certain cryptographic functions. Many vendors currently equip their platforms with a TPM claiming to be TCG compliant. However, there is no feasible way for application developers and ...

Keywords: TPM, compliance, test, trusted computing**7 Improving the browsing experience: WebPod: persistent Web browsing sessions with ** **pocketable storage devices**

Shaya Potter, Jason Nieh

May 2005 **Proceedings of the 14th international conference on World Wide Web
WWW '05****Publisher:** ACM PressFull text available:  [pdf\(166.59 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present WebPod, a portable system that enables mobile users to use the same persistent, personalized web browsing session on any Internet-enabled device. No matter what computer is being used, WebPod provides a consistent browsing session, maintaining all of a user's plugins, bookmarks, browser web content, open browser windows, and browser configuration options and preferences. This is achieved by leveraging rapid improvements in capacity, cost, and size of portable storage devices. WebPod p ...

Keywords: checkpoint/restart, portable storage, process migration, virtualization, web browsing**8 System support for pervasive applications ** Robert Grimm, Janet Davis, Eric Lemar, Adam Macbeth, Steven Swanson, Thomas Anderson, Brian Bershad, Gaetano Borriello, Steven Gribble, David Wetherall
November 2004 **ACM Transactions on Computer Systems (TOCS)**, Volume 22 Issue 4**Publisher:** ACM PressFull text available:  [pdf\(1.82 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Pervasive computing provides an attractive vision for the future of computing. Computational power will be available everywhere. Mobile and stationary devices will dynamically connect and coordinate to seamlessly help people in accomplishing their tasks. For this vision to become a reality, developers must build applications that constantly adapt to a highly dynamic computing environment. To make the developers' task feasible, we present a system architecture for pervasive computing, called & ...

Keywords: Asynchronous events, checkpointing, discovery, logic/operation pattern, migration, one.world, pervasive computing, structured I/O, tuples, ubiquitous computing**9 Migration: The design and implementation of Zap: a system for migrating computing ** **environments**

Steven Osman, Dinesh Subhraveti, Gong Su, Jason Nieh

December 2002 **ACM SIGOPS Operating Systems Review**, Volume 36 Issue SI

Publisher: ACM Press

Full text available:  pdf(2.06 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [cited by](#), [index terms](#)

We have created Zap, a novel system for transparent migration of legacy and networked applications. Zap provides a thin virtualization layer on top of the operating system that introduces pods, which are groups of processes that are provided a consistent, virtualized view of the system. This decouples processes in pods from dependencies to the host operating system and other processes on the system. By integrating Zap virtualization with a checkpoint-restart mechanism, Zap can migrate a pod of p ...

10 Caching in networks (extended abstract)

Friedhelm Meyer auf der Heide, Berthold Vöcking, Matthias Westermann

February 2000 **Proceedings of the eleventh annual ACM-SIAM symposium on Discrete algorithms SODA '00**

Publisher: Society for Industrial and Applied Mathematics

Full text available:  pdf(1.09 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)



11 Session 7: OS architecture II: Easing the management of data-parallel systems via adaptation



David Petrou, Khalil Amiri, Gregory R. Ganger, Garth A. Gibson

September 2000 **Proceedings of the 9th workshop on ACM SIGOPS European workshop: beyond the PC: new challenges for the operating system EW '9**

Publisher: ACM Press

Full text available:  pdf(146.51 KB)

Additional Information: [full citation](#), [abstract](#), [references](#)

In recent years we have seen an enormous growth in the size and prevalence of data processing workloads [Fayyad 1998, Gray 1997]. The picture that is becoming increasingly common is depicted in Figure 1. In it, organizations or resourceful individuals provide services via a set of loosely-coupled workstation nodes. The service is usually some form of data-mining like searching, filtering, or image recognition. Clients, which could be machines running web browsers, not only initiate requests, but ...

12 Attestation and binding: A protocol for property-based attestation



 Liqun Chen, Rainer Landfermann, Hans Löhr, Markus Rohe, Ahmad-Reza Sadeghi, Christian Stüble, Horst Görtz

November 2006 **Proceedings of the first ACM workshop on Scalable trusted computing STC '06**

Publisher: ACM Press

Full text available:  pdf(279.99 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The Trusted Computing Group (TCG) has issued several specifications to enhance the architecture of common computing platforms by means of new functionalities, amongst others the (binary) attestation to verify the integrity of a (remote) computing platform/application. However, as pointed out recently, the binary attestation has some shortcomings, in particular when used for applications: First, it reveals information about the configuration of a platform (hardware and software) or application. T ...

Keywords: TCG binary attestation, property-based attestation, security kernels, zero-knowledge proof of knowledge

13 A scalable key-management scheme with minimizing key storage for secure group communications



Yuh-Min Tseng

November 2003 **International Journal of Network Management**, Volume 13 Issue 6

Publisher: John Wiley & Sons, Inc.

Full text available:  [pdf\(104.15 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Recently, many group communication services have become the focus for future developments in the Internet and wireless network applications, such as video-conferencing, collaborative work, networking games or online videos. In particular, these applications require data delivery from one sender to a large number of authorized receivers. Therefore, secure multicast communication will become an important networking issue in the future. Using a common encryption key only known by authorized members ...

14 Zones, contracts and absorbing changes: an approach to software evolution 

 Huw Evans, Peter Dickman

October 1999 **ACM SIGPLAN Notices , Proceedings of the 14th ACM SIGPLAN conference on Object-oriented programming, systems, languages, and applications OOPSLA '99**, Volume 34 Issue 10

Publisher: ACM Press

Full text available:  [pdf\(2.46 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper describes a novel approach to managing the evolution of distributed, persistent systems at run-time. This is achieved by partitioning a system into disjoint zones, each of which can be evolved without affecting code in any other. Contracts are defined between zones, making type-level interdependencies and inter-zone communication explicit. Programmer supplied code is added to the running system, at the boundary between zones, to constrain the sco ...

15 Supporting dynamic data structures on distributed-memory machines 

 Anne Rogers, Martin C. Carlisle, John H. Reppy, Laurie J. Hendren

March 1995 **ACM Transactions on Programming Languages and Systems (TOPLAS)**, Volume 17 Issue 2

Publisher: ACM Press

Full text available:  [pdf\(2.05 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Compiling for distributed-memory machines has been a very active research area in recent years. Much of this work has concentrated on programs that use arrays as their primary data structures. To date, little work has been done to address the problem of supporting programs that use pointer-based dynamic data structures. The techniques developed for supporting SPMD execution of array-based programs rely on the fact that arrays are statically defined and directly addressable. Recursive data s ...

Keywords: dynamic data structures

16 Short papers -- storage survivability: Toward securing untrusted storage without 

 **public-key operations**

Dalit Naor, Amir Shenhav, Avishai Wool

November 2005 **Proceedings of the 2005 ACM workshop on Storage security and survivability StorageSS '05**

Publisher: ACM Press

Full text available:  [pdf\(344.77 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Adding security capabilities to shared, remote and untrusted storage file systems leads to performance degradation that limits their use. Public-key cryptographic primitives, widely used in such file systems, are known to have worse performance than their symmetric

key counterparts. In this paper we examine design alternatives that avoid public-key cryptography operations to achieve better performance. We present the trade-offs and limitations that are introduced by these substitutions.

Keywords: network attached storage, secure file systems

17 Decentralized storage systems: Farsite: federated, available, and reliable storage for
an incompletely trusted environment

Atul Adya, William J. Bolosky, Miguel Castro, Gerald Cermak, Ronnie Chaiken, John R. Douceur, Jon Howell, Jacob R. Lorch, Marvin Theimer, Roger P. Wattenhofer
December 2002 **ACM SIGOPS Operating Systems Review**, Volume 36 Issue SI

Publisher: ACM Press

Full text available:  [pdf\(1.87 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [cited by](#), [index terms](#)

Farsite is a secure, scalable file system that logically functions as a centralized file server but is physically distributed among a set of untrusted computers. Farsite provides file availability and reliability through randomized replicated storage; it ensures the secrecy of file contents with cryptographic techniques; it maintains the integrity of file and directory data with a Byzantine-fault-tolerant protocol; it is designed to be scalable by using a distributed hint mechanism and delegatio ...

18 Sensorsnet services: TSAR: a two tier sensor storage architecture using interval skip
graphs

Peter Desnoyers, Deepak Ganesan, Prashant Shenoy
November 2005 **Proceedings of the 3rd international conference on Embedded networked sensor systems SenSys '05**

Publisher: ACM Press

Full text available:  [pdf\(444.47 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Archival storage of sensor data is necessary for applications that query, mine, and analyze such data for interesting features and trends. We argue that existing storage systems are designed primarily for flat hierarchies of homogeneous sensor nodes and do not fully exploit the multi-tier nature of emerging sensor networks, where an application can comprise tens of tethered proxies, each managing tens to hundreds of untethered sensors. We present *TSAR*, a fundamentally different storage ar ...

Keywords: archival storage, indexing methods, wireless sensor networks

19 Modeling the storage architectures of commercial database systems

D. S. Batory
December 1985 **ACM Transactions on Database Systems (TODS)**, Volume 10 Issue 4

Publisher: ACM Press

Full text available:  [pdf\(4.46 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Modeling the storage structures of a DBMS is a prerequisite to understanding and optimizing database performance. Previously, such modeling was very difficult because the fundamental role of conceptual-to-internal mappings in DBMS implementations went unrecognized. In this paper we present a model of physical databases, called the transformation model, that makes conceptual-to-internal mappings explicit. By exposing such mappings, we show that it is possible to model the storage ...

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A high performance, universal, key associative access method



David B. Lomet

May 1983 **ACM SIGMOD Record , Proceedings of the 1983 ACM SIGMOD international conference on Management of data SIGMOD '83**, Volume 13 Issue 4

Publisher: ACM Press

Full text available: [pdf\(1.81 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

A new file organization is proposed that combines the advantages of digital B-trees and extendible hashing methods into one organization that can be used universally. The method, like these predecessors, relies on digital searching. The key notions are: (i) that multipage nodes are addressed by the root and can have both data and index entries, the mix of entries changing over time; and (ii) that these nodes can be doubled with file growth and, when this occurs, data nodes at the next level of t ...

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